

Study Guide

For use with pages 648 - 652

GOAL Recognize how statistics can be misleading.

VOCABULARY

Bar and line graphs could be misleading if the scale appears to distort the data in some way. An *average* can be represented by the mean, the median, or the mode. You may get a misleading impression of a data set if the average that is used does not represent the data well.

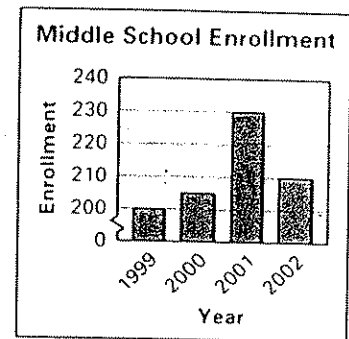
EXAMPLE 1 Potentially Misleading Graphs

The bar graph shows the enrollment in a middle school in 4 different years. Without using the scale, compare enrollment in 1999 and 2001. Then compare enrollment using the scale.

Solution

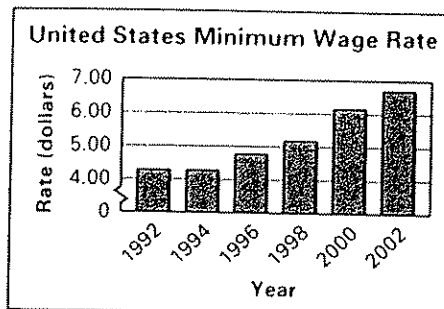
Enrollment in 1999 appears to be about $\frac{1}{4}$ the enrollment in the year 2001, because the 1999 bar is $\frac{1}{4}$ as high as the 2001 bar.

Enrollment in 1999 was actually about 87% of the enrollment in 2001, because $200 \div 230 \approx 87\%$. The break in the scale distorts the relative heights of the bars.



Exercises for Example 1

In Exercises 1 and 2, use the following information. The bar graph shows the United States minimum wage rate from 1992 to 2002.



$$\begin{array}{r} \$4.25 \\ \hline 1992 \end{array}$$

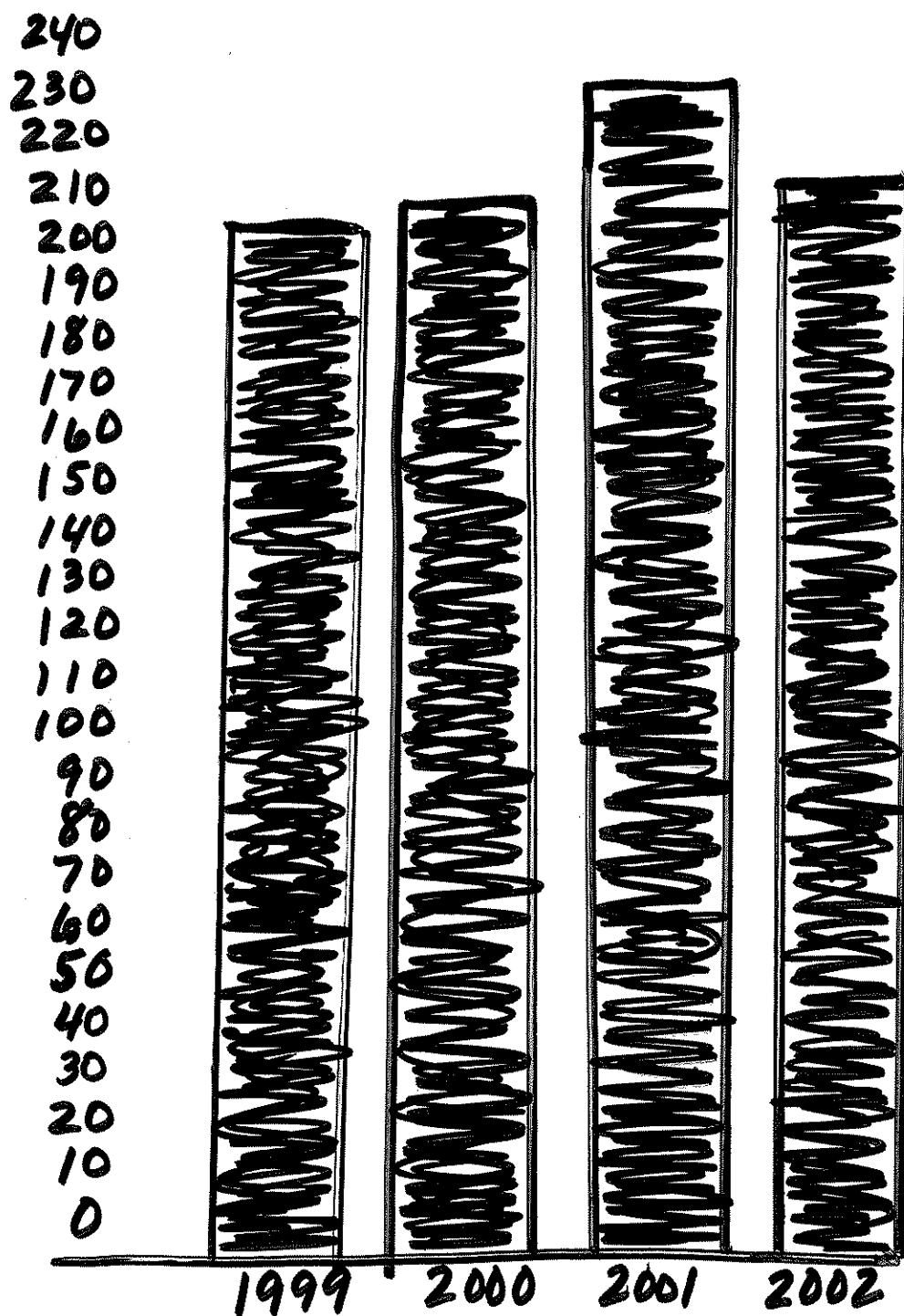
$$\begin{array}{r} \$6.75 \\ \hline 2002 \end{array}$$

- Without using the scale, compare the minimum wage rate in 1992 and 2002. *1992 appears to be 1/3 of that in 2002*
- Compare the ^{min wage} minimum wage rate in 1992 and 2002 using the scale. *1992 min wage was 64% of that in 2002*

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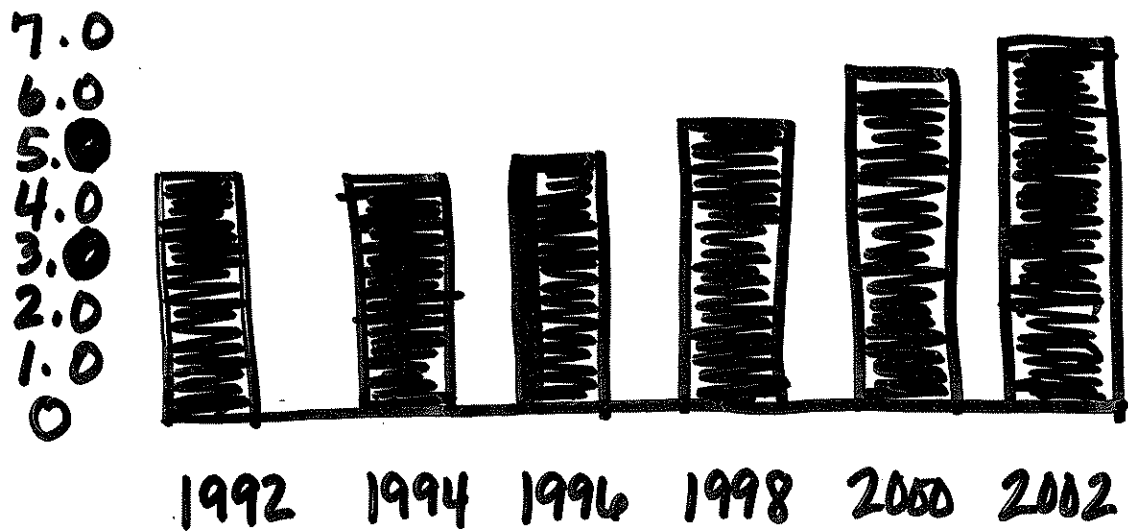
Ex. 1

Middle School Enrollment



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U.S. Minimum Wage Rate



1992 - \$ 4.25

2002 - \$ 6.50 - \$ 6.75

64% differ

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EXAMPLE 2 Misleading Averages

An automobile dealer says that the average miles per gallon (mi/gal) of gasoline for six car models he sells is 19. The miles per gallon of the six models are

17, 15, 16, 16, 14, and 36.

Does 19 mi/gal describe the average miles per gallon well? Why might an automobile dealer use this average? *No - it's high b/c of 36 b/c greater miles/gallon sells cars*

Solution

The mean, 19 mi/gal, does not describe the data well because it is higher than the miles per gallon of all but one of the vehicles. The automobile dealer might use 19 mi/gal as the average to convince potential buyers that the six models use gasoline efficiently.

Exercise for Example 2

- Describe an average that more accurately shows the average miles per gallon for the six vehicles.

either median or mode - both are 16 mi/gal